International Journal of Geology, Mineralogy, and Geochemistry of Mineral Deposits

Official Bulletin of the Society for Geology Applied to Mineral Deposits

MINERALIUM DEPOSITA

Founded in 1966 by G. C. Amstutz, A. Bernard, K. C. Dunham, P. Evrard, E. Grip, G. L. Krol, I. de Magnée, A. Maucher, P. Ramdohr, P. Routhier and P. Zuffardi

Editor

David Rickard

Department of Earth Sciences Cardiff University Cardiff CF1 3YE, UK

Editorial Office

Department of Earth Sciences Cardiff University Cardiff CF1 3YE, UK

Volume 29, 1994

Editorial Board

J. Aichler

Czech Geological Survey P.O. Box 65 790 01 Jeseník, Czech Republic

A. E. Fallick

Scottish Universities Research and Reactor Centre East Kilbridge Glasgow G75 0QU, UK

L. Fontboté

Département de Minéralogie Université de Genève Rue des Maraîchers 13 CH-1211 Genève, Switzerland

P. M. Herzig

Institut für Mineralogie, Geochemie und Lagerstättenlehre, Lehrstuhl für Lagerstättenlehre, Technische Universität Bergakademie Freiberg Brennhausgasse 14 D-09596 Freiberg, Germany

R. Kerrich

Department of Geological Sciences University of Saskatchewan, Saskatoon Canada S7N 0W0, Canada

P. Landais

CREGU Boîte Postale 23 F-54501 Vandœuvre Cedex, France

D. J. Morgan

British Geological Survey Kingsley Dunham Centre Keyworth Nottingham, NG12 5GGG, UK

H. Prichard

(Book Review Editor)
Department of Earth Sciences
Cardiff University
Cardiff CF1 3YE, UK

I. Ryabchikov

Institut of Geology 35 Staromonetny Perenlok Moskow 109017 Russian Federation

T. Seward

Institut für Mineralogie und Petrographie ETH Zentrum CH-8092 Zurich, Switzerland

K. Shelton

Department of Geological Sciences University of Missouri Columbia, MO 65211, USA

T. Urabe

Geological Survey of Japan 1-1 Higashi, Tsukuba Ibaraki 305, Japan

W. Vivallo

Department of Geology University of Chile Casilla, 13518 Santiago, Chile

J. Walshe

Department of Geology Australian National University Canberra, ACT 2601, Australia

Advisory Board

G. C. Amstutz, Heidelberg (Germany);
 G. Friedrich, Aachen (Germany);
 E. Horikoshi, Toyama (Japan);
 V. Köppel, Zurich (Switzerland);
 M. Stemprok, Praha (Czechoslovakia);
 E. Stumpfl, Leoben (Austria)

Springer International



Copyright

Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders. All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Special regulations for photocopies in the USA: Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0026-4598, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

The Canada Institute for Scientific and Technical Information (CISTI) provides a comprehensive, world-wide document delivery service for all Springer-Verlag journals. For more information, or to place an order for a copyright-cleared Springer-Verlag document, please contact Client Assistant, Document Delivery, Canada Institute for Scientific and Technical Information, Ottawa K1A 0S2, Canada (Tel: 613-993-9251; Fax: 613-952-8243; e-mail: cisti.docdel@nrc.ca).

Springer-Verlag / Berlin Heidelberg New York London Paris Tokyo Hong Kong Barcelona Printed in Germany by Triltsch, Würzburg – © Springer-Verlag, Berlin Heidelberg 1994 Springer-Verlag GmbH & Co. KG, Berlin

Contents

Editorial

Sundblad K, Parr JM: Swedish Svecofennian ore deposits 109

Parr JM → Sundblad K

Prefaces

Frietsch R: Ore geology related to prospecting - a national Swedish research programme 110

Lottermoser BG: Australian Proterozoic gold-copper deposits 207

Originals

Al Ganad I, Lagny P, Lescuyer JL, Ramboz C. Touray JC: Jabali, a Zn-Pb-(Ag) carbonate-hosted deposit associated with Late Jurassic rifting in Yemen 44

Andersen T → Ettner DC

Baker JH → Hellingwerf RH

Baumann A: Lead and strontium isotopes in metalliferous and calcareous pelitic sediments of the Red Sea axial trough

Billström K, Vivallo W: Synvolcanic mixing of ore lead and the development of lead isotopic provinces in the Skellefte district, Sweden 111

Billström K → Broman C

Bjørlykke A → Ettner DC

Bone Y → Hein KAA

Both RA → Hein KAA

Bouchot V, Gros Y, Piantone P: Dynamics of shallow late-Variscan gold mineralization: the Le Châtelet Au-arsenopyrite quartz veins, Massif Central, France 461

Boyce AJ → Thomson B

Broman C, Billström K, Gustavsson K, Fallick AE: Fluid inclusions, stable isotopes and gold deposition at Björkdal, northern Sweden 139

Brown D: Low temperature, low pressure deformation and metamorphism of the Vangorda massive sulphide orebody, Yukon, Canada 330

Chryssoulis SL → Mumin AH Conrad JE → Friedman JD

Cook NJ, Klemd R, Okrusch M: Sulphide mineralogy, metamorphism and deformation in Matchless massive sulphide deposit, Namibia 1

Cozens GJ → Huston DL

Davidson GJ, Large RR: Gold metallogeny and the copper-gold association of the Australian Proterozoic 208

Davidson GJ: Hostrocks to the stratabound iron-formation-hosted Starra gold-copper deposit, Australia. I. Sodic lithologies

Dissanayake CB: Origin of vein graphite in high-grade metamorphic terrains. Role of organic matter and sediment subduction

Ettner DC, Bjørlykke A, Andersen T: A fluid inclusion and stable isotope study of the Proterozoic Bidjovagge Au-Cu deposit, Finnmark, northern Norway¹ 16

Fallick AE → Broman C

Fallick AE → Hallberg A

Fallick AE → Thomson B Fallick AE → Weihed P

Fleet ME → Mumin AH

Friedman JD, Conrad JE, McKee EH,

Mutschler FE, Zartman RE: Possible Mesozoic age of Ellenville Zn-Pb-Cu(Ag) deposit, Shawangunk Mountains,

New York 474

Gallagher V → Hellingwerf RH

Gatedal K → Hellingwerf RH

Griffin BJ → Lawrance LM

Gros Y → Bouchot V

Gustavsson K → Broman C

Hallberg A, Fallick AE: The Enåsen gold deposit, central Sweden. 2. Light element stable isotope evidence of premetamorphic hydrothermal activity 163

Hallberg A: The Enåsen gold deposit, central Sweden. 1. A palaeoproterozoic high-sulphidation epithermal gold mineralization 150

Hein KAA, Both RA, Bone Y: The geology and genesis of the Tarcoola gold deposits, South Australia 224

Heinhorst JP, Lehmann B: A radiotracer study on the kinetics of gold sorption by mineral surfaces 399

Hellingwerf RH, Gatedal K, Gallagher V, Baker JH: Tourmaline in the central Swedish ore district 189

Hoffmann CF → Khin Zaw

Huston DL, Cozens GJ: The geochemistry and alteration of the White Devil porphyry: implications to intrusion timing

Huston DL → Khin Zaw

Kersten G → Möller P

Khin Zaw, Huston DL, Large RR, Mernagh T, Hoffmann CF: Microthermometry and geochemistry of fluid inclusions from the Tennant Creek gold-copper deposits: implications for ore deposition and exploration 288

Klemd R → Cook NJ

Kogita S → Kojima S

Kojima S, Takeda S, Kogita S: Chemical factors controlling the solubility of uraninite and their significance in the genesis of unconformity-related uranium depos-

Lagny P → Al Ganad I

Large RR → Davidson GJ

Large RR → Khin Zaw

Lawrance LM, Griffin BJ: Crystal features of supergene gold at Hannan South. Western Australia 391

Lehmann B → Heinhorst JP Lescuyer JL → Al Ganad I

Markkula H → Öhlander B McKee EH → Friedman JD

Mernagh T → Khin Zaw

Möller P. Kersten G: Electrochemical accumulation of visible gold on pyrite and arsenopyrite surfaces 404

Morrison RS → Stolz AJ

Mucci A → Wood SA

Mumin AH, Fleet ME, Chryssoulis SL: Gold mineralization in As-rich mesothermal gold ores of the Bogosu-Prestea mining district of the Ashanti Gold Belt, Ghana: remobilization of "invisible" gold 445

Mutschler FE → Friedman JD

Nie FJ: Rare earth element geochemistry of the molybdenum-bearing granitoids in the Jinduicheng-Huanglongpu district, Shaanxi Province, northwest China 488

Öhlander B, Markkula H: Alteration associated with the gold-bearing quartz veins at Middagsberget, northern Sweden 120

Okrusch M → Cook NJ

Pan P, Wood SA: Solubility of Pt and Pd sulfides and Au metal in aqueous bisulfide solutions. II. Results at 200° to 350°C and saturated vapor pressure 373

Pan P → Wood SA Piantone P → Bouchot V Piestrzyński A → Wodzicki A

Ramboz C → Al Ganad I

Rattenbury MS: A linked fold-thrust model for the deformation of the Tennant Creek goldfield, northern Australia 301

Rice C → Thomson B

Ripa M: The mineral chemistry of hydrothermally altered and metamorphosed wall-rocks at the Stollberg Fe-Pb-Zn-Mn(-Ag) deposit, Bergslagen, Sweden

Rodgers KA: The geochemical role of atoll phosphates on Vaitupu, Nukulaelae, Funafuti and neighbouring low islands of Tuvalu, central Pacific 68

Stolz AJ, Morrison RS: Proterozoic igneous activity in the Tennant Creek region,

Northern Territory, Australia, and its relationship to Cu-Au-Bi mineralisation

Sundblad K: A genetic reinterpretation of the Falun and Åmmeberg ore types, Bergslagen, Sweden 170

Takeda S → Kojima S Thomson B, Fallick AE, Boyce AJ, Rice C: The Candelaria silver deposit, Nevada – preliminary sulphur, oxygen and hydrogen isotope geochemistry 318

Touray JC → Al Ganad I

Uitterdijk Appel PW: Stratabound scheelite in altered Archaean komatiites, West Greenland 341

Vivallo W → Billström K

Weihed P, Fallick AE: A stable isotope study of the Palaeoproterozoic Tallberg porphyry-type deposit, northern Sweden 128

Williams PJ: Iron mobility during synmetamorphic alteration in the Selwyn Range area, NW Queensland: implications for the origin of ironstone-hosted Au-Cu deposits 250

Wodzicki A, Piestrzyński A: An ore genetic model for the Lubin-Sieroszowice mining district, Poland 30

Wood SA, Pan P, Zhang Y, Mucci A: The solubility of Pt and Pd sulfides and Au in bisulfide solutions. I. Results at $25^{\circ}-90^{\circ}\text{C}$ and 1 bar pressure 309 Wood SA \rightarrow Pan P

Zartman RE \rightarrow Friedman JD Zhang Y \rightarrow Wood SA

Mineralium Deposit Letters

Abd el Wahab S → Taher AG Abe N → Arai S Agdemir N, Kirikoglu MS, Lehmann B, Tietze J: Petrology and alteration geochemistry of the epithermal Balya Pb-Zn-Ag deposit, NW Turkey. A reconnaissance study 366

Arai S, Abe N: Podiform chromitite in the arc mantle: chromitite xenoliths from the Takashima alkali basalt, Southwest Japan arc 434

Bai W-J → Zhou M-F

Gaspar JC → Gonzaga GM Giuliani G → Michel D

Gokçe A, Spiro B: Stable isotope study of antimony deposits in the Muratdagi region, western Turkey 361

Gonzaga GM, Teixeira NA, Gaspar JC: The origin of diamonds in western Minas Gerais, Brazil 414

Hofmann BA: Formation of a sulfide melt during Alpine metamorphism of the Lengenbach polymetallic sulfide mineralization, Binntal, Switzerland 439

Ikramuddin M → Shah MT

Jost H → Michel D

Kelepertsis AE → Kontis E Kirikoglu MS → Agdemir N

Kontis E, Kelepertsis AE, Skounakis S: Geochemistry and alteration facies associated with epithermal precious metal mineralization in an active geothermal system, northern Lesbos, Greece 430

Krumbein WE → Taher AG

Lehmann B → Agdemir N

Michel D, Giuliani G, Pulz GM, Jost H: Multistage gold deposition in the Archaean Maria Lázara gold deposit (Goiás, Brazil) 94 Philip G → Taher AG
Pulz GM → Michel D
Robinson PT → Zhou M-F

Shah MT, Ikramuddin M, Shervais JW: Behaviour of Tl relative to K, Rb, Sr and Ba in mineralized and unmineralized metavolcanics from the Dir area, northern Pakistan 422

Shervais JW \rightarrow Shah MT Skounakis S \rightarrow Kontis E Spiro B \rightarrow Gokçe A

Taher AG, Abd el Wahab S, Krumbein WE, Philip G, Wali AM: On heavy metal concentrations and biogenic enrichment in microbial mat environments 427 Teixeira NA → Gonzaga GM Tietze J → Agdemir N

Wali AM → Taher AG

Zhou M-F, Robinson PT, Bai W-J: Formation of podiform chromitites by melt/rock interaction in the upper mantle 98

Mineralium Deposita Referees 1993 102

Book reviews 103

Announcements 107, 206, 274, 372, 443, 499

Conference report 206

Forthcoming papers 249, 372, 443, 499

